

REMARKS

In the Office Action, the Examiner required restriction to one of the following inventions under 35 U.S.C. § 121: I. Claims 1-37, drawn to a method of consolidation, classified in Class 166, Subclass 292. II. Claims 38-49, drawn to a resin composition, classified in Class 507, Subclass 203. During a telephone conversation with the Examiner, a provisional election was made without traverse to prosecute the invention of Group I, claims 1-37. The Applicants hereby affirm the election. Claims 38-49 have been withdrawn from further consideration by the Examiner as being drawn to a non-elected invention.

The Examiner rejected claims 1-4, 6, 7, 9-15, 17-23, 25, 26, 28-34, 36 and 37 under 35 U.S.C. § 103(a) as being unpatentable over Brown et al. (3,681,287) in view of Shu (5,522,460), Boles et al. (4,476,931) and Powell et al. (2004/0154799).

The patent to Brown et al. (3,681,287) discloses a method of consolidating siliceous materials such as sand using a hardenable resin composition comprised of a furan resin, a solvent, an organosilane coupling agent and an acid catalyst. However, Brown et al. does not indicate anywhere that their process could or should be used in underground formations to consolidate the formations.

The patent to Shu discloses a sand consolidating method for use in an unconsolidated or loosely consolidated formation which comprises introducing a first solution comprising furan resin and a water miscible organic solvent into the formation to be consolidated, the water miscible organic solvent being selected from the group consisting of alcohols, water soluble carboxylic acids, ketones and mixtures thereof, introducing a spacer volume of water into the formation and thereafter, introducing a second solution comprising acid into the formation.

In the Office Action, the Examiner states that it would have been considered obvious to use the resin of Brown et al. for consolidating formations as taught by Shu. It is respectfully submitted by the Applicants that a person having ordinary skill in the art would not utilize the hardenable resin composition of Brown et al. for consolidating formations as taught by Shu. On the contrary, one skilled in the art would utilize the teachings of Shu.

The Examiner further states that Boles et al. teaches that it is known to use a brine preflush containing a surface active agent (cationic surfactant) prior to well treating and that Boles et al. uses the preflush containing the cationic surfactant to allow the subsequent treating solution to better wet and penetrate the formation. Further, the Examiner stated that Powell et al. teaches that it is known to use a brine overflush for the purpose of removing treating material from the well and well bore equipment, and that it would have been considered obvious to use an overflush in the process of Brown et al. as taught by Powell et al. for the purpose of Powell et al. which is to remove the treating fluid from the well and the well bore equipment thereby preventing undue wear and degradation of the equipment used in the treating operation. Again, it is respectfully submitted by the Applicants that one skilled in the art would not look to Powell et al. since Powell et al. used the overflush to remove the treating fluid from the well and well bore equipment which prevents undue wear and degradation of the equipment used in the treating operation.

Claim 1 has been amended in paragraphs (a) and (c) to “introducing a brine preflush containing a C₁₂-C₂₂ alkyl phosphonate cationic surfactant into said subterranean zone around and adjacent to said well bore” (step a) and “to displace the resin composition from the pore space in the subterranean zone” (step c). Claim 4 which was dependent from claim 1 and called for the cationic surfactant in the brine preflush to be selected from the group consisting of

ethoxylated nonyl phenol phosphate ester, C₁₂ to C₂₂ alkyl phosphonate surfactants, and mixtures of the surfactants has been canceled. Also, claim 5 which was dependent from claim 1 and called for the cationic surfactant to be C₁₂ to C₂₂ alkyl phosphonate surfactant has been canceled. As a result, it is respectfully submitted that claim 1 should now be allowed.

Claim 2 which is dependent from claim 1 calls for the brine preflush and overflush to be sodium chloride brines. Claim 3 dependent from claim 2 calls for the sodium chloride to be present in the brine preflush and overflush in an amount of about 15% by weight of the brine preflush and overflush. It is respectfully submitted that claims 2 and 3 are allowable and the fact that the patent to Boles et al. teaches the use of a preflush to better wet and penetrate the formation does not prevent one skilled in the art from using brine preflushes to accomplish different objectives.

As to claims 2 and 21 which call for the brine preflushes and overflushes to be sodium chloride brines have been rejected by the Examiner based on the patent to Boles et al. which calls for a potassium chloride instead of sodium chloride. The fact that Boles et al. calls for a potassium chloride preflush or overflush does not make it obvious to one skilled in the art to utilize sodium chloride instead.

As concerns claims 3, 6, 11, 14, 17, 22, 25, 30, 33 and 36, the Examiner stated that the exact amount of preflush used and the exact amount of surface active agent used and the amount of solvent used and the amount organosilane used and the amount of acid catalyst used would have been considered obvious since the amounts vary depending significantly on the properties of the formation to be treated. Claims 3, 6, 11, 14 and 17, are all directly or indirectly dependent from claim 1 and call for specific amounts that can be used in accordance with the present invention. It is respectfully submitted that such claims are allowable along with claim 1. As

concerns claims 22, 25, 30, 33 and 36, those claims are dependent from method claim 20. Method claim 20 is similar to claim 1 except that it includes circulating a cleanup brine in step (c) instead of a brine overflush, allowing the hardenable resin composition to harden in the pore spaces in the subterranean zone in accordance with step (d) and then fracturing the subterranean zone and placing particulate proppant material therein in step (e). It is respectfully submitted that claims 20 along with claims 22, 25, 30, 33 and 36 are allowable. In addition, dependent claims 21, 26, 27, 28, 29, 31, 32, 34 and 35 are all directly or indirectly dependent from claim 20 and it is respectfully submitted that such claims are allowable. Claims 23, and 24, have been canceled.

As to claims 7 and 26, the Examiner stated that the furan resin can be furfuryl alcohol in the patent to Brown et al. and claims 9 and 28 can be dioxane used as the solvent in Brown et al.; that as to claims 10 and 29 tetrahydrofuran can be used as the solvent; that as to claims 12, 13, 31 and 32 Brown et al. teaches that the organosilane can be aminopropyltrioxysilane; that as to claims 15 and 34 Brown et al. teaches that the acid catalyst can be mineral acid salt; that as to claims 18 and 37 the brine preflush of Boles et al. is introduced below the fracture pressure; that as to claim 19 the afterflush of Powell et al. is introduced below the fracture pressure; and that as to claim 20 Shu teaches that after the resin hardens, the zone can be fractured and propped.

It is respectfully submitted by the Applicants that the Examiner is substituting different chemicals for those called for in the claims of the present application and states that the chemicals can substitute for those called for in the claims of the present application. It is respectfully submitted by the Applicants that the chemicals called for in the claims of the present application are different from those indicated by the Examiner and as a result, the various claims calling for the different chemicals are allowable.

Finally, the Examiner indicated that claims 5, 8, 16, 24, 27 and 35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 5 has been canceled and the subject matter of claim 5 has been added to currently amended claim 1. As concerns claims 8 and 16, they are dependent from claim 1 and it is submitted they are allowable. In addition, claims 23 and 24 have been canceled, claim 27 is dependent from claim 20 and claim 35 is dependent from claim 20.

For all of the various reasons given above, it is respectfully submitted by the Applicants that claims 1-3, 6-22, and 25-37 are allowable and the allowance of such claims is respectfully requested.

This is intended to be a complete response to the Office Action mailed on January 11, 2005.

I hereby certify that this correspondence is being deposited in the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment; Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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